

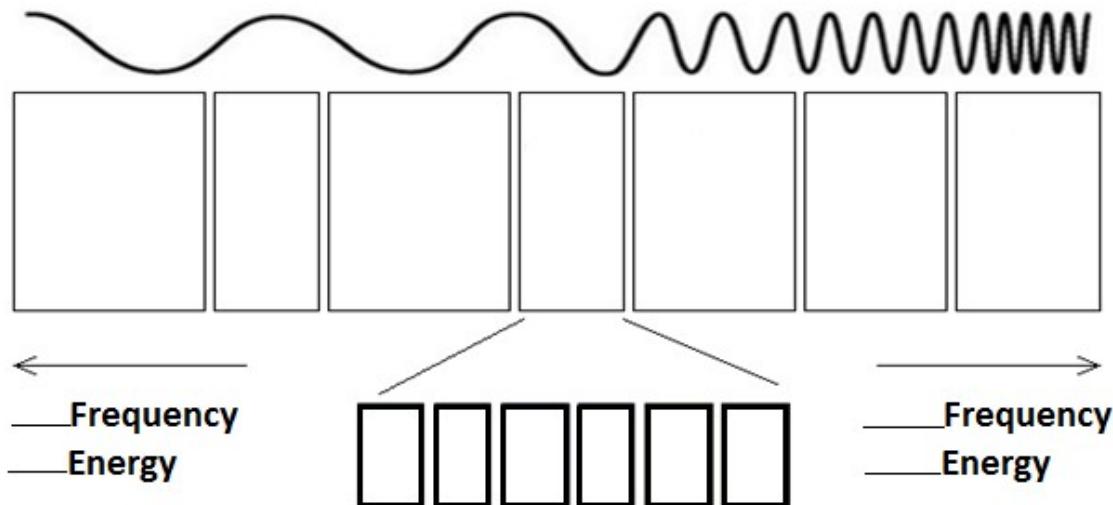
Astronomy - Final Exam Study Guide

Go back through your notes to help you thoroughly answer each question. Questions provide review of main ideas, but other concepts conveyed in labs, videos, and class discussions within each unit are likely to show up on the exam as well.

Unit 1 - Light and Optics

o Electromagnetic Spectrum

o Label the types of electromagnetic radiation in the boxes below. Can you also name a couple uses of each type?



o EMR is organized according to what property? _____

o What is the relationship between wavelength & frequency?

■ Label "High" or "Low" on the lines next to Frequency on the diagram above

o What is the relationship between wavelength & energy?

■ Label "High" or "Low" on the lines next to Energy on the diagram above

o Use colored pencils to shade in the visible spectrum boxes on the diagram.

■ What **color** of **visible** light has the highest energy? _____

■ What **color** of **visible** light has the lowest energy? _____

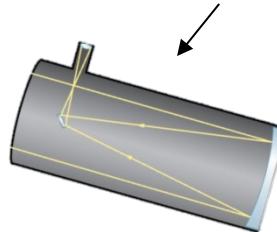
o Which type of EM radiation has the highest energy? _____ Lowest?

o Which type of EM radiation has the highest frequency? _____ Lowest?

o Telescopes

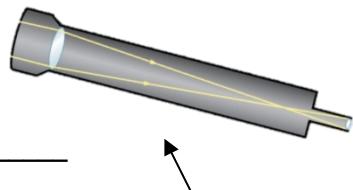
o What benefits do telescopes provide?

- _____
- _____
- _____



o Differentiate between **refracting** and **reflecting** telescopes.

■ Label the telescope at right that is a refractor



■ What does it use to focus light? _____

■ Label the telescope at right that is a reflector

■ What does it use to focus light? _____

o Who was the first person to use a telescope to look at the night sky?

■ Which of the two optical telescope designs did he use?

o Describe a GOOD location for a ground-based telescope:

o Astronomers use both ground-based and space-based telescopes. Use the chart below to organize the pros and cons of each.

Ground-Based	Space-Based
Pros:	Pros:
Cons:	Cons:

o What is the name of NASA's newest space telescope?

■ This telescope will replace which other famous, but aging space telescope?

Unit 2 - Universe, Galaxies and Solar System

● The Universe

o What **theory** aims to explain the origins of the universe?

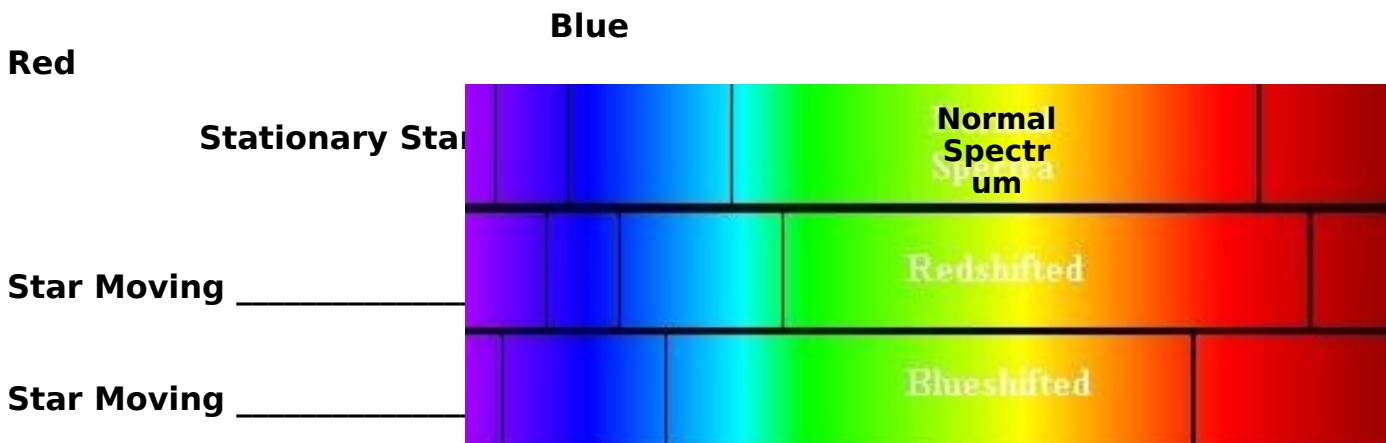
o What is happening to the universe? _____

■ How did Edwin Hubble determine this? What did he notice about the light coming from

nearby galaxies? _____ - shift

■ On the diagram below, label which spectrum is **red-shifted** and which is **blue-shifted**.

■ Indicate which star below is moving **towards** us and which is moving **away** from us.



o Be familiar with the END of UNIVERSE Theories. Based on the images provided, complete the missing sections of the chart below:

Theory Name			
Description of what might happen:			
What this looks like:			
● Galaxies			

- What is a galaxy?

- What are the three possible shapes of galaxies?

- What shape is our Milky Way Galaxy?

- What exists at the center of most galaxies?

● Solar System

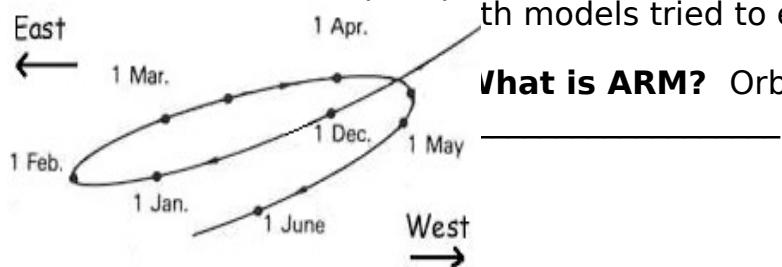
- Know the **two** competing models of the solar system, and which one is correct.

- **Heliocentric:** _____

- **Geocentric:** _____

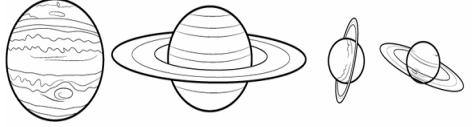
- Be familiar with **apparent retrograde motion (ARM)** of Mars and

th models tried to explain it.



What is ARM? Orbiting objects appear to move _____.

- Geocentric model added _____ (smaller orbits within bigger orbits) to explain Mars' weird movements.
- Heliocentric model explained that Earth orbits _____ than Mars because it is _____ to the sun. When Earth passes Mars, it looks like Mars is moving backwards in the sky.
- Know the names and basic characteristics of the planets in the solar system:

		
<u>Names</u>		
<u>General Characteristics</u>		

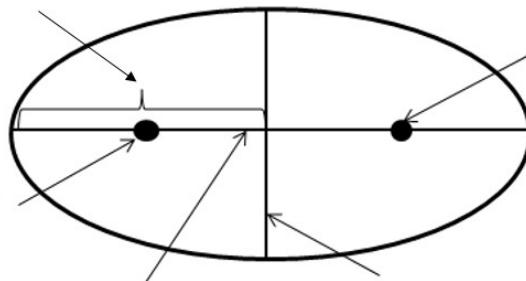
- What type of object is Pluto? _____

- Why is it not considered a true planet?

● **Kepler's Laws of Planetary Motion**

- **First Law:**

- Label the parts of an ellipse:



o **Second Law:**

o **Third Law:**

- Can be represented as the equation: $\underline{\hspace{2cm}}^2 = \underline{\hspace{2cm}}^3$
- Know how to solve 3rd law math problems. Solve for the missing values below:

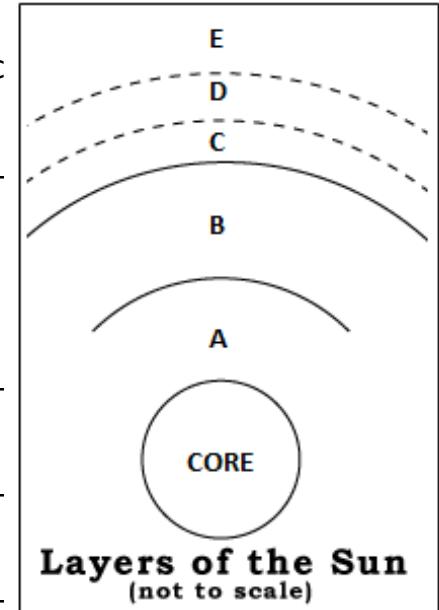
Average Distance from the Sun (AU)	Orbital Period (years)
3.5 AU	<u> </u> years
<u> </u> AU	32 years

Unit 3 - The Sun/Stars and Space Weather

● **Structure of the sun**

o Know the layers of the sun and basic description of each

- Which letter shows the Sun's **Chromosphere**?
- Which letter shows the Sun's **Corona**?
- Which letter shows the Sun's **Radiation Zone**?
- Which letter shows the Sun's **Photosphere**?
- Which letter shows the Sun's **Convection Zone**?



o How does the sun make energy? _____

o In which layer does this process take place? _____

● **Space Weather**

o What data do we use to track the solar cycle? _____

o Times of peak sunspot numbers are called: _____

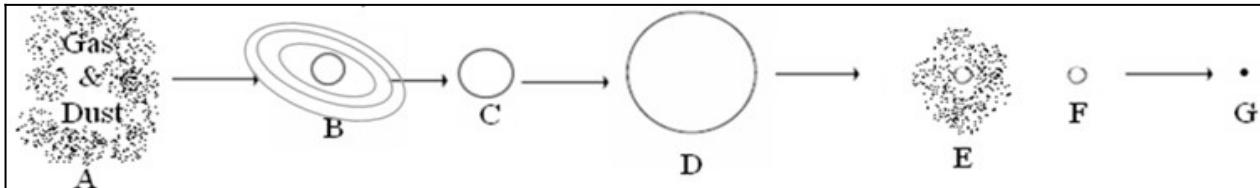
o Times of low sunspot numbers are called: _____

- o Length of one complete solar cycle is about _____ years.
- o Data for what other solar-related occurrence follows a similar cycle?

- o In what ways could these storms effect our lives?

● Life Cycles of Stars

Low to medium mass stars (like the sun):



Name of Stage

Letter on Diagram

_____ Stage of our sun—fusing hydrogen into helium _____

_____ Cold, **dark** core of a dead star _____

_____ Star fuses helium into carbon & expands _____

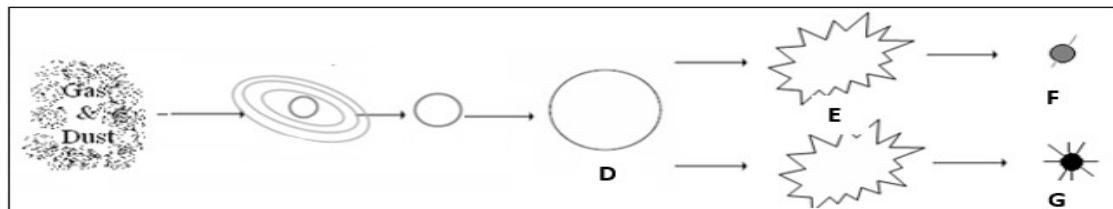
_____ Cloud of gas and dust from which a star is born _____

_____ Small, but hot core of a dying star _____

_____ Forming star; before nuclear fusion has begun _____

_____ All fusion has ended and star is losing its outer layers _____

High mass stars:



Name of Stage

Letter on Diagram

_____ Massive star fuses heavier elements & expands _____

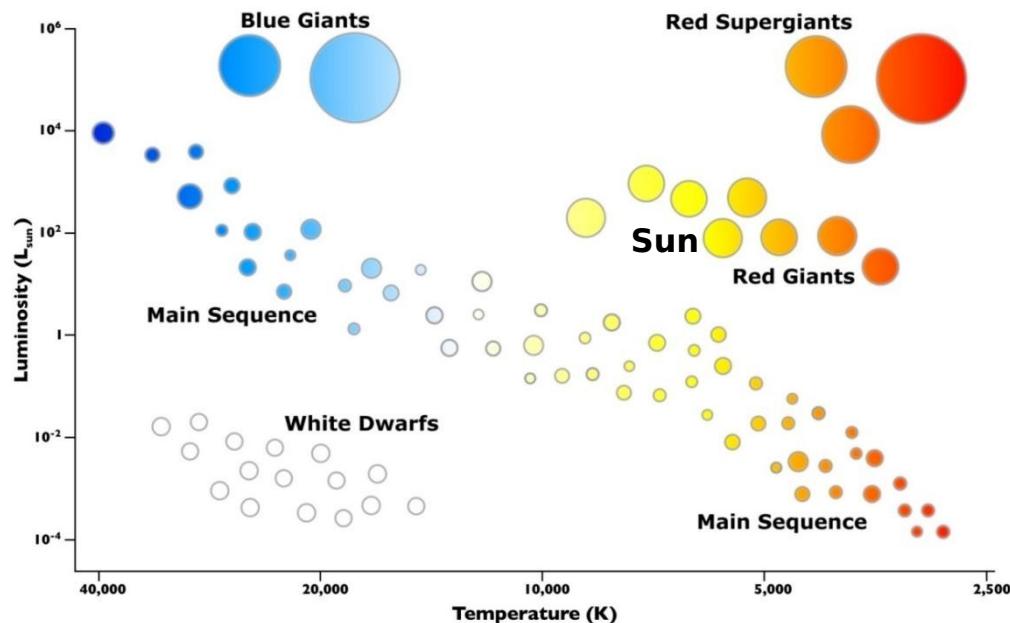
_____ explosion of a massive star _____

_____ Remnant of **most** massive stars; immense gravitational pull _____

_____ Remnant of massive stars; sometimes form jets of light _____

● H-R Diagram

- o Know the difference between **absolute** and **apparent magnitude**.
- o Be able to read and interpret an H-R diagram.
- o ADD Labels for different groupings of stars below AND Label the approximate location of the Sun:



- Which group of stars is COOLEST and BRIGHTEST?

- Which group of stars is HOTTEST and DIMMEST?

- Which group does our Sun belong to?

- Which group of stars is the OLDEST?

- Which group is fusing Hydrogen into helium in their cores?

- Which group can **only** fuse helium into carbon?

- Which group can fuse carbon and beyond?

Unit 4: The Moon

● Theories about how the moon may have formed

- o Moon formed from a blob of material that broke off Earth:

- o Earth and the moon formed near each other:

- Moon formed from the debris after Earth collided with another object:

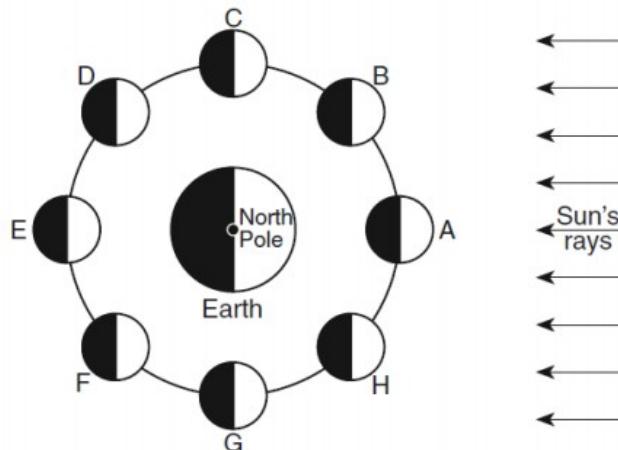
- Earth captured the moon when it drifted too close:

- Which is currently the leading theory for how our moon may have formed?

● Surface Features of the Moon



What we call the powdery lunar soil:



of the phase at each position indicated and

Name of Phase	Looks Like
	
	
	
	
	
	
	

● Moon Phases and Tides

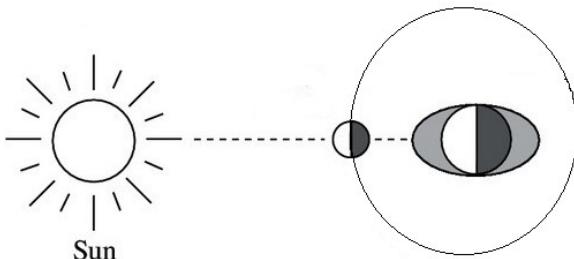
- Know that both the Sun and the moon effect the tides, but the moon's effect is **greater**.
- Know the difference between spring tides and neaps tides and the phases that go with each.

Type of tide shown: _____

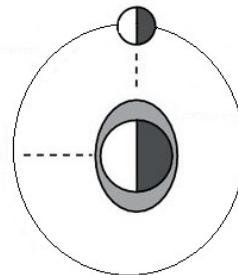
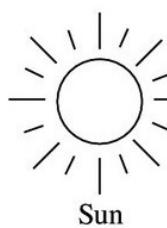
What phase is the moon in below? _____
in below? _____

What other phase causes this tide? _____
tide? _____

Add the moon in this phase to the diagram below:
diagram below:



**Unit 5:
History**



Type of tide shown: _____

What phase is the moon

What other phase causes this
Add the moon in this phase to the

NASA and Space Exploration

Directions: Please match the NASA program on the right with its description on the left. Each letter is used only **once!**

_____ The goal of this program was to send astronauts to the moon.

A. Artemis

_____ This program used monkeys on test flights before
Sending humans into space.

B. Skylab

_____ America's **first** long-term structure in space which
served as a science laboratory.

C. Gemini

_____ NASA's newest program which will hopefully take
humans to Mars one day.

**D. Space
Shuttle**

_____ Reusable spacecraft used to **shuttle** astronauts and
supplies to and from the International Space Station.

E. Apollo

_____ This program resulted in the first 2-man missions
including the first American spacewalk.

F. Mercury

_____ This program is still in operation and includes a permanent
space structure where astronauts from different
countries live and work together in space for months

**G.
International
Space
Station**

● Astrobiology

**● Earth is located at a perfect distance from the sun that keeps it from
getting too hot or too cold.**

o What do we call this "sweet spot"? _____

- **Scientific theories of how life began on Earth.** Add the name of the theory on the blanks provided:

Theory	Definition
	The theory that basic life was <i>brought</i> to Earth by comets or asteroids.
	The theory that life began on Earth after many chemical reactions.

- **The basic ingredients for life**

 - All life on Earth needs at least 3 key things. Please list them below:

 - _____
 - _____
 - _____

- **Extremophiles.** Complete the boxes below:

	Definition:	Example from class:
Extremophile		

 - **Where we might find life beyond Earth?** Provide the names of some places in the **solar system** that we discussed in class may have the 3 ingredients for life:

 - _____
 - _____
 - _____

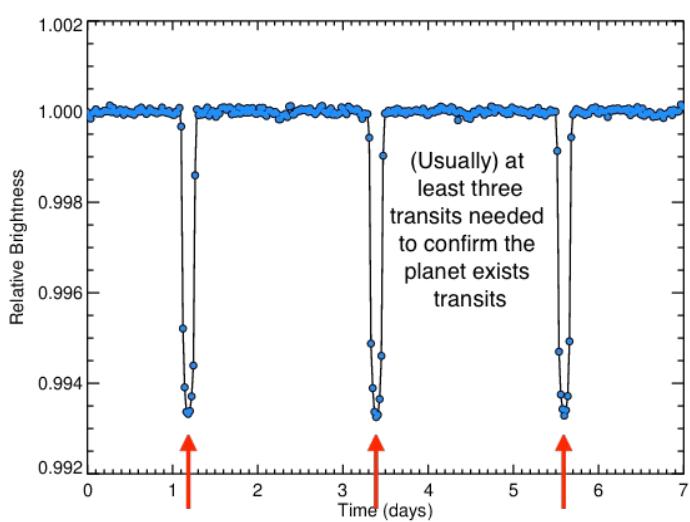
- **Exoplanets and the Kepler Space Telescope (KST)**

 - What is an exoplanet?

 - What method is used by Kepler and TESS to find exoplanets? _____

- Explain how this method works:

- Below is an example of a **light curve** graph. Use it to calculate how far this exoplanet is from its star and its size:



Exoplanet Characteristics				
Calculate Distance from Sun:	Use Kepler's 3 rd Law: $P^2 = A^3$		**Convert days to years	
Calculate Size:	Change in Brightness:	Square rooted:	Multiply by 10:	Answer: